

Notice of Allowability

Application No.

10/080,682

Examiner

Brian J. Sines

Applicant(s)

HENRIOT ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the response filed 9/22/2004.
2. ☒ The allowed claim(s) is/are 3-7.
3. ☒ The drawings filed on 25 February 2002 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Carl. I. Brundidge on 9/30/2004.

The application has been amended as follows:

6. A method for continuous detection of thermodynamic hydrate formation conditions, at any point of a pipe carrying a multiphase mixture of petroleum fluids, using a mechanistic hydrodynamic module and an integrated compositional thermodynamic module to define the phase properties, and applying mass conservation and momentum conservation equations, as well as equations of energy transfer in the mixture, considering that the multiphase mixture is substantially continuously at equilibrium, a composition of the multiphase mixture is variable all along the pipe and a mass of each constituent of the mixture is globally defined by a mass conservation equation regardless of phase state thereof, and the petroleum fluids are lumped together into a limited number of pseudo-components, comprising [detecting thermodynamic hydrate formation conditions by]:

carrying out a lumping of the petroleum fluids into selected pseudo-components so as to isolate the hydrate forming components, with a definition for each pseudo-component of a mass fraction and of a number of characteristic physical quantities[,]; and

applying to said modules data relative to the selected pseudo-components so as to determine at any point along said pipe a hydrate dissociation temperature.

7. A method for continuous control of hydrate formation at any point of a pipe carrying a multiphase mixture of petroleum fluids, using a mechanistic hydrodynamic module and an integrated compositional thermodynamic module to define the phase properties, and applying mass conservation and momentum conservation equations, as well as equations of energy transfer in the mixture, considering that the multiphase mixture is substantially continuously at equilibrium, a composition of the multiphase mixture is variable all along the pipe and a mass of each constituent of the multiphase mixture is globally defined by a mass conservation equation regardless of phase state thereof, and the petroleum fluids are grouped together into a limited number of pseudo-components, comprising:

a) detecting hydrate formation conditions by :

carrying out a grouping of the petroleum fluids into selected pseudo-components so as to isolate the hydrate forming components, with a definition for each pseudo-component of a mass fraction and of a number of characteristic physical quantities, and

by applying to said modules data relative to these particular pseudo-components so as to determine a hydrate dissociation temperature;

b) determining at any point along said pipe, a temperature of said mixture of petroleum fluids;

[b)]c) using a control device to compare said temperature of the petroleum fluids with [the] said hydrate dissociation temperature; and

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[c)]d) applying measures intended to [fight] control hydrate formation under [the] said control device.

Allowable Subject Matter

Claims 3 – 7 are allowed.

The following is an examiner's statement of reasons for allowance:

The cited prior art neither teach nor fairly suggest a method for the continuous detection of thermodynamic hydrate formation conditions at any point of a pipe carrying a multiphase mixture of petroleum fluids using a mechanistic hydrodynamic module and an integrated compositional thermodynamic module to define the phase properties, wherein the method involves applying mass conservation and momentum conservation equations, as well as equations of energy transfer in the mixture, considering that the multiphase mixture is substantially continuously at equilibrium, a composition of the multiphase mixture is variable all along the pipe and a mass of each constituent of the mixture is globally defined by a mass conservation equation regardless of phase state thereof, and the petroleum fluids are lumped together into a limited number of pseudo-components, wherein the method is comprising the steps of: carrying out a lumping of the petroleum fluids into selected pseudo-components so as to isolate the hydrate forming components, with a definition for each pseudo-component of a mass fraction and of a number of characteristic physical quantities; and applying to the modules data relative to the selected pseudo-components so as to determine at any point along the pipe a hydrate dissociation temperature.

The cited prior art neither teach nor fairly suggest a method for the continuous control of hydrate formation at any point of a pipe carrying a multiphase mixture of petroleum fluids using

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a mechanistic hydrodynamic module and an integrated compositional thermodynamic module to define the phase properties, wherein the method involves applying mass conservation and momentum conservation equations, as well as equations of energy transfer in the mixture, considering that the multiphase mixture is substantially continuously at equilibrium, a composition of the multiphase mixture is variable all along the pipe and a mass of each constituent of the multiphase mixture is globally defined by a mass conservation equation regardless of phase state thereof, and the petroleum fluids are grouped together into a limited number of pseudo-components, wherein the method is comprising the steps of: detecting hydrate formation conditions by: carrying out a grouping of the petroleum fluids into selected pseudo-components so as to isolate the hydrate forming components, with a definition for each pseudo-component of a mass fraction and of a number of characteristic physical quantities, and by applying to the modules data relative to these particular pseudo-components so as to determine a hydrate dissociation temperature; determining the temperature of the mixture of petroleum fluids at any point along the pipe; using a control device to compare the temperature of the petroleum fluids with the hydrate dissociation temperature; and applying measures intended to control hydrate formation using the control device.


Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian J. Sines, Ph.D. whose telephone number is (571) 272-1263. The examiner can normally be reached on M-F (11 AM - 8 PM EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Jill Warden
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